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EXAMINER

LIN, SHEW FEN

ART UNIT PAPER NUMBER

2166

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/629,744	Applicant(s) BORDAWEKAR ET AL.	
	Examiner Shew-Fen Lin	Art Unit 2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 8-13, 29 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 14-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

- a. This action is taken in response to amendments and remarks filed on 12/5/2006.
- b. Claims 1-7 and 14-28 are pending in this Office Action.

Withdrawal of Rejections

In view of the amendment to claims 1 and 14-15, Examiner hereby withdraws the 101 rejection that was given in the previous Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not provide enough information to enable person skilled in the art being able to correspond the first/second parameter to the maximum/minimum number of children in each node. Therefore, first and second parameters would be examined based on the best understanding by the Examiner.

Claims 1, 14-16, and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which

Art Unit: 2166

was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1, 16, and 22 recited the limitation; "said labels comprise integer numbers having a size that is bounded by said first parameter and said second parameter" is not disclosed in the specification.

Claims 14 and 15 recited the limitation; "in pre-order traversal" is not disclosed in the specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "said auxiliary ordered tree" in line 11-12. There is insufficient antecedent basis for this limitation in the claim. It is unclear that if "said auxiliary ordered tree" is the same as "the auxiliary ordered tree" disclosed in lines 3 and 7 of claim 14.

Response to Amendment and Remarks

Applicant's remarks with respect to claims 1-7 and 14-28 have been fully reconsidered but are not deemed persuasive for the reasons set forth below.

Response to Remarks on 35 U.S.C. § 112 First Paragraph Rejection

Regarding to claim 1, Applicants submit that the specification explains that there “are two exemplary parameters, f and s, for the label tree, which may be selected and which may determine the shape of the tree” and “..., where f defines the maximum fanout of the label tree, and s determines the number of sub-trees created after a split. The inventors call this factor the “split factor.”....”. Since parameter s is a “split factor” and could not be the “second parameter corresponding to a selected minimum number of children for each node”. For example, if the parameter f is 5 and parameter s is 3, it is obvious that the minimum children for each node could not be 3 (parameter s). Therefore, specification does not provide enough information how to build the auxiliary ordered tree based on first parameter and second parameter (minimum number of children for each node).

Regarding to claims 14 and 15, Examiner hereby withdraws the rejections that were given in the previous Office Action.

Response to Remarks on 35 U.S.C. § 112 Second Paragraph Rejection

In view of the amendment to claim 7, Examiner hereby withdraws the rejection that was given in the previous Office Action.

Response to Remarks on the Prior Rejection

Applicant’s amendments and remarks have been fully and carefully considered. In response to these amendments, another iteration of claim analysis, based on previously relied on

Art Unit: 2166

references, and particularly addressing the newly amended limitation, has been made. Refer to the corresponding sections of the claim analysis for details.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-5, 16, 18-19, 22, and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Neil et al. (US Patent, 6,889,226, hereinafter referred as O'Neil) in view of Gulutzan et al. (Peter Gulutzan, Trudy Pelzer, "SQL Performance Tuning", Addison Wesley Professional, September 10, 2002, hereinafter referred as Gulutzan).

As to claims 1, 16, and 22, O'Neil discloses a system with methods /means / system maintaining the order of nodes in a hierarchical document (abstract, lines 3-7, Figures 2-3), comprising:

selecting a first parameter corresponding to a selected maximum number of children for each node for an auxiliary ordered tree (limit by bit length, column 9, lines 50-58);

selecting a second parameter corresponding to a selected minimum number of children for each node of the auxiliary ordered tree;

building the auxiliary ordered tree (Figure 5) having at least as many leaves as atoms within said hierarchical document (Figure 3, column 1, lines 39-41) based upon the first and second parameters;

attaching the atoms to the leaves of said auxiliary ordered tree (Figure 3, column 6, lines 66-67); and

labeling each of the nodes in the auxiliary ordered tree (column 1, lines 48-54, column 6, lines 48-51); and

communicating the labeled nodes of the auxiliary ordered tree to a user (Figures 1, 4, column 8, lines 26-34),

wherein said labels comprise integer numbers having a size that is bounded by said first parameter and said second parameter(column 8, lines 48-52, column 9, lines 50-58).

O'Neil discloses the elements of claims 1 as noted above but does not explicitly disclose "selecting a second parameter corresponding to a selected minimum number of children for each node for an auxiliary ordered tree".

Gulutzan discloses B+trees are the default structure built for indexing and searching (page 1). A B+tree of order m is a tree with the characteristics: every node has at most m children (maximum number of child, page 2); every node except for the leaves has at least $(m/2)$ children (minimum number of child, page 2); all leaves appear on the same level; and all keys are in the leaf nodes (page 2).

It would have been obvious to a person of ordinary skill in the art at the time of invention was made to modify O'Neil's disclosure to include a minimum number children for each node $(m/2)$ as taught by Gulutzan for the purpose of building labeled tree based on B+Tree of order m . The skilled artisan would have been motivated to improve the invention of O'Neil per the above to reduce the number of disk accesses for fast updating (insert/delete) (sortable, selective, subset, and balanced, page 3, Gulutzan).

As to claims 3 and 24, O'Neil discloses further comprising assigning labels to the atoms in the hierarchical document based upon the labels assigned to the corresponding leaves in the auxiliary ordered tree (assign label to nodes, Figure 4, column 8, lines 7-15).

As to claims 4, 18, and 25, O'Neil discloses further comprising storing the labels of the leaves of the auxiliary ordered tree (store in plurality of rows, Figure 4, column 8, lines 7-9).

Art Unit: 2166

As to claims 5, 19, and 26, O'Neil discloses further comprising storing the remaining portion of the auxiliary ordered tree (store in plurality of rows, Figure 4, column 8, lines 7-9).

Claims 2, 7, 17, 21, 23, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Neil in view of Gulutzan and further in view of Dietz ("Maintaining order in a linked list", ACM, 1982, page 122-127).

As to claims 2, 17, and 23, O'Neil and Gulutzan (referred as O'Neil-Gulutzan) disclose the elements of claims 1 as noted above but does not explicitly disclose, "labeling nodes based on height of the node and the maximum number of children per node", wherein the labeling of the nodes in the auxiliary tree is defined by:

$$N(\text{root})=0;$$
$$N(x)=N(y)+I \cdot (f-1)^{h(x)}; \text{ and } 0 \leq I < f$$

Where:

$N(x)$ is the label for node x ;

x is the i^{th} child of y ;

f is the maximum number of children per node; and

$h(x)$ is the height of node x .

Dietz discloses using an indexed 2-3 tree to maintaining order in a linked list (abstract, page 122). The indexed 2-3 trees satisfy the following properties: all leaves occur at the same depth in the tree; all nonleaves have 2 or 3 children; the root has index 0; x has index $p(y) + (i-1) 3^{h(x)}$ (page 123, right column, paragraph 1-2).

It would have been obvious to a person of ordinary skill in the art at the time of invention was made to modify O'Neil-Gulutzan's disclosure to label B+Tree using $N(x)=N(y)+I \cdot (f-$

Art Unit: 2166

$1)^{h(x)}$; and $0 \leq I < f$ (replace the maximum number[3] of a 2-3 indexed tree with the maximum number [f-1] of B+Tree, a B+tree of order m is a generalization of 2-3 indexed tree) as taught by Dietz for the purpose of renumbering the whole list only every f insertions (page 123, left column, paragraph 6, Dietz). The skilled artisan would have been motivated to improve the invention of O'Neil-Gulutzan per the above such that the order of the tree is maintained while minimizing renumbering (page 122, right column, paragraph 3, Dietz).

As to claims 7, 21, and 28, Dietz discloses further comprising re-assigning labels to the atoms in the hierarchical document based upon the labels assigned to the corresponding leaves in the updated auxiliary ordered tree (renumbering all descendants nodes when inserting new node causing split due to exceed maximum allowable number, page 123, right column, paragraph 2).

Claims 6, 20, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Neil in view of Gulutzan and further in view of Abiteboul et al. ("Compact labeling schemes for ancestor queries", In Proceedings of 12th ACM-SIAM Symposium on Discrete Algorithms (2001) 547--556, hereinafter referred as Abiteboul).

As to claims 6, 20, and 27, O'Neil discloses using descendant limit on subtrees to speed up the search but does not explicitly disclose partitioning tree into leaves and the rest of the portion.

Abiteboul discloses partitioning tree into a first portion that comprises the leaves (page 548, paragraph 2, lines 6-9) from the tree and a second portion that comprises the remaining portion of the tree (parenthesized label, page 548, paragraph 2, lines 6-9).

It would have been obvious to a person of ordinary skill in the art at the time of invention was made to modify O'Neil-Gulutzan's disclosure to partition tree into a two level partition as taught by Abiteboul for the purpose of reduce the maximum label size (page 548, left column, paragraph 2, lines 9-14). The skilled artisan would have been motivated to improve the invention of O'Neil-Gulutzan per the above such that the size of label is compacted and can be maintained in the memory to enhance search (page 547, abstract, paragraph 2, Abiteboul).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. ("ViST: A Dynamic Index Method for Querying XML Data by Tree Structure", ACM SIGMOD, June, 2003, hereinafter referred as Wang) in view of Rastogi et al. (US Patent, 6,247,016, hereinafter referred as Rastogi).

As to claim 14, Wang discloses a method of optimizing the cost of maintaining the order of nodes in a hierarchical document using an auxiliary ordered tree having at least as many leaves as atoms within a hierarchical document (abstract, lines 10-13), the shape of the auxiliary ordered tree being based upon a selected maximum number of children for each node and a selected minimum number of children for each node (B+tree has maximum/minimum number of children depending on order, abstract, lines 16-18, Figure 6), the method comprising adjusting the maximum number of children for each node and the selected minimum number of children

Art Unit: 2166

for each node of the auxiliary ordered tree based upon application requirements regarding one of update cost, total cost of queries and updates, and the size of the labels; and

Communicating the adjusted auxiliary ordered tree to a user (query, abstract), wherein the nodes of said auxiliary ordered tree have numerical labels (Figure 9) according to a recursive formula (page 5, algorithm 1) and the leaves in a label tree correspond to the nodes in a corresponding XML tree in pre-order traversal (Figure 6, page 5).

Wang does not explicitly disclose optimizing one of update cost, total cost of queries and updates, and the size of the labels.

Rastogi discloses optimizing cost by minimizing split cost (column 5, lines 25-36, column 8, lines 46-50).

It would have been obvious to a person of ordinary skill in the art at the time of invention was made to modify Wang's disclosure to adjust split and associated subtree as taught by Rastogi for the purpose of minimizing the size and cost of subtree (column 8, lines 22-27, Rastogi). The skilled artisan would have been motivated to improve the invention of Wang per the above such that the cost is optimized.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Abiteboul.

As to claim 15, Wang discloses a method of encoding an auxiliary ordered tree having at least as many leaves as atoms within a hierarchical document (abstract, lines 10-13), the shape of the auxiliary ordered tree being based upon a selected maximum number of children for each node and a selected minimum number of children for each node (B+tree has maximum/minimum

number of children depending on order, abstract, lines 16-18, Figure 6), the method comprising minimizing space requirements using a virtual tree; and

Communicating the adjusted auxiliary ordered tree to a user (query, abstract), wherein the nodes of said auxiliary ordered tree have numerical labels (Figure 9) according to a recursive formula (page 5, algorithm 1) and the leaves in a label tree correspond to the nodes in a corresponding XML tree in pre-order traversal (Figure 6, page 5).

Wang discloses a virtual suffix tree to organize structure to speed up the matching process (page 2, paragraph 3, lines 6-8) but does not explicitly disclose minimizing space requirements using a virtual tree.

Abiteboul discloses creating virtual tree by partitioning tree into a first portion that comprises the leaves (page 548, paragraph 2, lines 6-9) from the tree and a second portion that comprises the remaining portion of the tree (parenthesized label, page 548, paragraph 2, lines 6-9).

It would have been obvious to a person of ordinary skill in the art at the time of invention was made to modify Wang's disclosure to partition tree into a two level partition as taught by Abiteboul for the purpose of reduce the maximum label size (page 548, left column, paragraph 2, lines 9-14, Abiteboul). The skilled artisan would have been motivated to improve the invention of Wang per the above such that the space requirement is minimized.

Conclusion

Applicant's amendment necessitated the new grounds of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 2166

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shew-Fen Lin whose telephone number is 571-272-2672. The examiner can normally be reached on 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on 571-272-3978. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-9600.

SFL
Shew-Fen Lin
Patent Examiner

Art Unit 2166
March 1, 2007



**HOSAIN ALAM
SUPERVISORY PATENT EXAMINER**